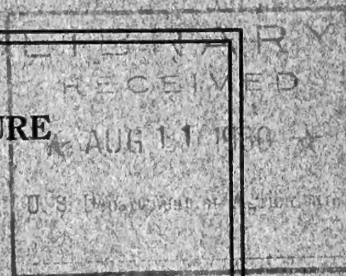


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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE



BRANCH OF RESEARCH

MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS

FOREST PRODUCTS

FOREST ECONOMICS

RANGE RESEARCH

JUN 1930



BRANCH OF RESEARCH

June, 1930

CONTENTS

	<u>Page</u>
Forest Experiment Stations	
Allegheny.....	1
Appalachian.....	3
California.....	6
Central States.....	18
Lake States.....	20
Northern Rocky Mountain.....	21
Northeastern.....	23
Pacific Northwest.....	24
Southern.....	28
Southwestern.....	34
Branch of Research, R-2.....	35
Manuscripts.....	38
Forest Products	
Region 1.....	40
Region 6.....	45
Forest Taxation Inquiry.....	48
Range Research	
Washington Office.....	49
Santa Rita.....	52
Jornada.....	53

FOREST EXPERIMENT STATIONS

ALLEGHENY FOREST EXPERIMENT STATION

General

By all odds the most important event of the month was the beginning of local cooperation with the Bureau of Plant Industry, Office of Forest Pathology. Mr. Jackson began work at Philadelphia on June 15, and we are informed that Mr. K. D. Doak, of the Department of Botany, Purdue University, will report about October 1. Jackson will work on the damping-off disease in forest nurseries, and on the decay of oak sprouts which occurs independent of fire injury. Doak will be the B. P. I. representative in the cooperative study of mycorrhiza. Jackson has a desk at 3437 Woodland Avenue, at least pending the final assignment of space in the botany building of the University.

The men at the other stations may be interested in our discovery that at least one of the large commercial insurance companies, handling liability insurance for those who drive automobiles, will extend to men who own cars of their own and carry insurance while driving them protection during the operation of Government cars. We understand the rate to be 25 per cent of the existing rate. This form of insurance should be cheaper in most instances than insurance offered through the R. W. Lee Company.

Management

Measurements of the chestnut oak seedlings at Camp Ockanickon continues. Plans for further studies of pollination were upset by the recent fires, which occurred just at the time that the oaks were in flower.

Hough completed two articles on white pine; one on diameter distribution, the other on the general silvical characteristics and the associates of the species. He also completed a memorandum covering the survey in the wrecked areas of aspen and fire cherry near Marienville, on the Allegheny National Forest. Hough reached Warren at the end of the month, and began preparation to go into camp in the virgin area south of Wetmore.

Mensuration

Bruce paid us a brief but inspiring visit in connection with the converting factor study. Schnur and Miss Loose have spent a good deal of time following up some of these suggestions, and in general we feel confidence in what we have done. Schnur completed the first draft of his article on the necessary refinements in computation when solving equations for several variables.

(Over)

Schnur and Miss Adelman have been compiling the data on the permanent sample plots of oak at Camp Ockanickon. Examination of the height data reveals no essential difference between the several plots, but considerable difference between the species. The latter differences appear in the following table:

D.B.H.:	Total Height			
	:Chestnut	Oak:	White Oak	: Pine*
2	20	17	15	
3	27	24	20	
4	32	30	24	
5	35	34	29	
6	38	37	32	
7	40	39	36	
8	41	41	38	
9	42	41	40	
Basis, trees	152	146	14	

*Pitch and shortleaf.

The white oak curve holds good for post and black oaks as well. The pine data are obviously inadequate, as there were a very few pine on these plots.

Protection - disease

Jackson visited the Parsons Nursery on the Monongahela Forest, and the nurseries of the Pennsylvania Department of Forests and Waters at Mont Alto, Clearfield, and Greenwood Furnace. He was particularly impressed by the Parsons Nursery, both its facilities and its personnel. During the same trip he visited the University of West Virginia at Morgantown, and scouted for oak cutting operations, where he might study decay of sprouts. In a scouting trip for the Dutch elm disease in western Pennsylvania he got as far as Warren, and consulted with Supervisor Bishop.

Protection - fire

With the assistance of Mr. Eyre, Wood and McComb laid out eleven plots in the emergency fire study in south Jersey. Five of these were located at Camp Ockanickon, and the others on the Lebanon and Bass River State Forests. Although the spring fires in southern New Jersey were very extensive, totaling as we understand it, about 160,000 acres, State Forester Wilber and State

Fire Warden Coyle did not seem to feel that the fires were unusually severe. They have certainly done a tremendous damage. The sample plots include a good assortment of species and size classes, and if observed for two or three years more should yield some excellent information. It was not possible to make positive and final estimates of the damage done to a large proportion of the trees, but they have been numbered for future examination.

Types

Mr. L. L. Lee of the New Jersey Agricultural Experiment Station, who mapped the soils at Camp Ockanickon, has proposed to Wood that they collaborate in a paper on the relationship of forest composition and soil in south Jersey. We have been glad to accept the idea, and have begun compiling the stand table figures for the several soil types at Camp Ockanickon area in order to fill gaps in our information. Whether soil type may be related to rate of growth remains to be seen.

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APPALACHIAN FOREST EXPERIMENT STATION

Loblolly Pine Study

MacKinney partially analyzed the data obtained from six loblolly pine sample plots near Witherbee, S. C. These plots were established in 1905 and have since been remeasured four times. They are all understocked and two of them have been severely depleted by attacks of the southern pine beetle. The data obtained, however, will give valuable information on the growth and development of loblolly pine stands.

Loblolly Pine Selective Logging

Korstian met R. D. Garver, of the Forest Products Laboratory at Witherbee, S. C. After looking over a tract on the lands of the North State Lumber Company plans were made for the third combined selective logging and mill scale study in the Mid-Atlantic Coastal Plain.

The tract selected has on it a stand of about 8,000 board feet per acre of mixed longleaf and loblolly pines. About one-half of the trees were left at the time of the last cutting, about 40 years ago. Data obtained on this study will round out the work done last fall and winter and in addition will give valuable information on the volume and quality increment of trees left after logging. Field work will start on this study about November 1.

Controlled Burning in Southern Pines.

The data taken on the controlled burning plots near Summerville, S.C., were partially analyzed. This experiment was initiated in 1916, when fifty longleaf pines were measured and described on each of two contiguous areas. One of these areas has been burned over annually since then and the other has had complete protection.

From descriptions taken in 1916 and from the condition of the present stand adjoining the burned area on three sides, it appears that the annually burned area had a density of stocking quite similar to that on the protected area at the inception of the experiment. If this is true the annual burning has reduced the wood production 2400 cubic feet per acre in 13 years. Other interesting results are shown in the following table:

	<u>Annually burned</u>	<u>Unburned</u>
No. trees per acre	465.	666.
Average D.B.H. in inches	4.4	5.1
Average height in feet	26.1	33.5
Average annual volume growth per tree in cubic feet.	0.263	0.275

Fire Damage

R. B. Wooten, who has been assistant in soils at the University of Florida during the past winter, returned to the Station for a second summer season, as temporary assistant, assigned to the fire damage project.

Early in June Hursh took soil samples on the annual burning plots at Drainland, S. C. These plots, established in 1913, consist of one annual burning plot and one control plot in the longleaf pine type. A comparison of the soil from the two plots shows a lower organic content, a lower moisture content, and a lower water holding capacity on the burned plot. Samples of five horizons from profiles in each of the two plots were collected for complete analysis. Studies designed to show the comparative biological activity in the surface layers on the burned and the unburned plots are now in progress.

Forest entomology

R. A. St. George arrived June 1 to start forest insect investigation work for this season. He was followed by R. W. Caird, who is to study the physiological problems in connection with southern pine beetle attacks, and field assistants Hugo Pawek and Barnard Huckenphaler, from the University of Minnesota.

In connection with wood preservation studies the saw kerf method was used for injecting poisons in a series of uninfested pine and hardwood trees. The purpose was to test the efficiency of this method in obtaining good distribution of poison and at the same time resistance to insect attack and decay.

Bark beetle attacked trees are also being injected with certain chemicals to test their effectiveness in destroying the insects and at the same time preventing spread of the blue stain associated with insect attack.

Forest Pathology

On his return from Minnesota Nelson spent his time preparing for the summer field work. R. L. Randolph, from Yale University, reported to help Nelson.

Forest Biology

The latter part of May, A. H. Howell, Senior Biologist of the Biological Survey, came to Asheville and in company with Thos. D. Burleigh spent all of June in a detailed study of the wild life of the higher mountain ranges of western North Carolina. It was felt advisable to devote a week to each spot visited, even this being almost too short a time to gain a very thorough knowledge of the birds and mammals indigenous to the region in question, but as varied situations as possible were chosen and a good start made in this study.

The first week was spent on Mt. Mitchell, the second in Indian Gap in the Smokies, the third on Grandfather Mountain, and the last at Highlands in Macon County.

The Camp on Mt. Mitchell was at approximately 6600 feet elevation, and here in the spruce and fir woods typically Canadian birds and mammals were observed and collected. Of the birds possibly the most interesting were the Crossbills (*Loxia curvirostra pusilla*), now rarely noted this far south. In view of the meager knowledge concerning their breeding habits it was of decided interest to collect a fully grown bird of the year, indicating March as the time when at least one pair of these birds reared their brood. Of the mammals, the Red-backed Vole, genus *Clethrionomys*, proved fairly plentiful, while the Shrews, of the genus *Sorex*, were unaccountably scarce.

At Indian Gap a very evident change in wild life was noted. Here the mountainsides were covered with a thick growth of practically virgin spruce, with no outcroppings of rock and little underbrush other than mountain ash and spruce reproduction. Conditions were seemingly rather unfavorable for

the larger predators such as foxes and wild cats, for no sign of any of these mammals was observed, and unquestionably as a result of this unusual scarcity rodents were surprisingly abundant. In four nights' trapping 74 small mammals were caught, representing 7 species. By far the most numerous were the Clethrionomys, while the scarcest, and the best take of the week, was the Lemming Vole (Synaptomys), one being caught at the edge of the clearing in the Gap. Birds were scarce, both in species and actual numbers. In a day's trip to the top of Clingmans Dome, a distance of approximately 6 miles each way, but 14 species were recorded, and few others were added during the week. Of most interest were the Black-capped Chickadees (Penthestes atricapillus) seen nowhere else during the month and fairly plentiful here, as well as the Brown Creepers (Certhia familiaris americana) likewise fairly plentiful here but scarce elsewhere.

Grandfather Mountain proved a very rugged, rocky mountain, quite a contrast to the Smokies, and with a change again evident in mammal and bird life. Here the larger predatory mammals were more or less in evidence, with a corresponding decrease in mice and shrews. The bird life in the spruce and firs was typically Canadian, and such species as the Golden-crowned Kinglet (Regulus regulus satrapa), Red-breasted Nuthatch (Sitta canadensis) and Brown Creeper were observed and collected.

The last week at Highlands uncovered possibilities little suspected at this relatively low elevation. On Cove Creek, below 4,000 feet in elevation, 500 acres of virgin hemlock were found in which conditions were as characteristically Canadian as in the spruces and firs well above 5,000 feet. Highlands lies but 6 miles from the Georgia line, so the presence of such birds as the Golden-crowned Kinglet and Red-breasted Nuthatch in hemlock timber in what was actually a pocket in these transition mountain slopes was rather unexpected. Mammals proved a little scarce. The Red-backed Voles were taken, at possibly the lowest elevation they ever reach here in the South, and likewise a Wood Rat, genus Neotoma, the first actual record as far as is known now for North Carolina.

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CALIFORNIA FOREST EXPERIMENT STATION

General

Kotok, as Chairman of the California Section of the Society of American Foresters, has prepared a brief for the Hoover-Young Water Commission, dealing with specific recommendations of the foresters. Three recommendations are included -

1. That technical foresters be added to all boards or commissions dealing with water resource development;
2. That more ample provision be made for fire protection to safeguard watersheds; and
3. That at least \$50,000 State and a like sum of Federal money be appropriated for forest research in the field of forest influences.

Fire

While none of the staff have yet been selected for fire research, preliminary steps have been taken to get the Shasta experimental studies under way. The first problem that will be given attention is detection. Methods for determining adequate detection will be worked out and means for checking lookout efficiency will likewise be determined. A hazard survey of a sample area is also contemplated.

Cover Types

Substantial progress was made during June by both cover-type crews in the field. One in Monterey County and the other in the Santa Barbara National Forest completed approximately nine townships each.

The nine townships in Monterey County makes the Monterey Unit complete. This natural topographic unit, which embraces all of Monterey County west of the Salinas River, has a total area of over 1800 square miles, almost 500 squares of which constitute the Monterey Division of the Santa Barbara National Forest. This is unquestionably the most interesting area mapped to date. With a rainfall varying from 10 to over 40 inches, its types are correspondingly variable. Two coniferous species, Bristlecone fir and Monterey cypress are found only in this region and this can practically be said of a third, Monterey pine. This area marks the southern limit of coast redwood and Douglas fir. There is much evidence to indicate that this last species now relegated to three small isolated stations, one a pure stand, one associated with western yellow pine, and the other associated with redwood, formerly ranged over a considerable area. From Santa Cruz Mountains to the Oregon line the slope redwood type is a mixture of redwood and Douglas fir and where crown fires have occurred Douglas fir has been exterminated leaving redwood associated with tanbark oak, madrone, or both, all of which reproduce by sprouting. Also tanbark oak and madrone woodland types are fire types replacing Douglas fir. Both of these fire types being well represented in the Monterey unit, it would seem that fires account for the present limited occurrence of Douglas fir. Other coniferous types of interest are pure sugar pine and pure western yellow pine, the latter occurring in some instances near the coast and adjoining pure redwood.

The Regional Drafting office will begin the compilation of the finished map at once. U. S. Geological Survey topographic maps of a scale 1:625,000 (approximately 1 inch=1 mile) are available for the entire area and these will be mounted as a whole upon which the types will be shown.

Forest Influences

Experimental runs on the five soil erosion tanks of the Berkeley installations are being completed by Sundling for the Aiken soil series. At the first of the month the soil surfaces were graded to destroy the development of an erosion pavement. Ten runs are being made in two series to determine the effect of heavy rains on freshly worked soil surfaces.

Erosion Pavement

These experiments have demonstrated the development of an erosion pavement which possesses two interesting characteristics. The more conspicuous feature is an accumulation of rock fragments on the surface as a result of sheet erosion. Rock fragments as in desert pavement represent the residual coarser material from a layer of soil. Agencies of removal, such as shallow sheets of water or wind have removed fine material and have left the larger unwieldy fragments behind gradually to accumulate on the surface. In time pavement constitutes the entire surface covering and checks effectively further surface removal from the soil surface, until gullyng sets in. The second feature comprises the sealed soil surface between pavement fragments. Filtering of muddy suspensions at the surface creates a crust like surface which effectively resists the impact of rain drops. Water flowing from these surfaces was clear. Erosion factors were thereby reduced to a low amount. This erosional phase is restricted chiefly to the zone of inception of processes in residual soils. Gullyng is directly related to accumulation of flow of sufficient strength to transport the larger included fragments of a soil.

The removal of the pavement and crust in the experimental installation exposed the soil to the full effect of rain drops, which were observed to be more effective than the shallow currents in dislodging soil fragments for removal. Similar studies are planned for another soil series of finer texture.

Forestry Tour on the Sierra National Forest

The Forestry Tour on the Sierra National Forest on June 7 and 8 was attended by Director Kotok, Lowdermilk, and Sundling. The tour was sponsored by the San Joaquin Valley Branch of the State Chamber of Commerce. It was conducted in a very efficient manner by Forest Supervisor M. A. Benedict.

The object of the tour was to give representatives of irrigation water companies of the San Joaquin Valley first hand knowledge of the methods of logging timber under National Forest regulations and to allay the feeling among irrigationists of the valley that cutting of the timber under proper regulation is impairing the water supply from the mountains.

The tour included a visit to our surficial run-off and erosion plot installation at North Fork where the purposes and results of the experiment were explained. Thence the party of about 50 was conducted by Forest Supervisor Benedict over cuttings on privately owned land where destructive high lead logging and slash fires had wrought gruesome devastation. Experimental planting had thus far netted only 40 per cent survival in a site which had formerly supported a splendid stand of sugar pine and western yellow pine of 100,000 B.F. per acre. The party was conducted after lunch into the woods to see powerful electric donkeys at work skidding heavy logs to landings. The development of a method involving control blocks and "Siwash" trees or guide trees or stumps to keep skidded logs in definite lanes previously selected was impressive as a considerable advance in safeguarding advance growth in logged stands.

It was possible to view considerable improvement in logging in the woods over former methods. The silvicultural significance of the present methods are considered later. But the relation of cutting to water yield from the watersheds was not so clearly evident. Great masses of trash, slash and broken and cull logs are filling the drainage channels. Logged areas are unsightly under the best conditions. There is an urgent need to establish the relation of logging to water yield and supply.

Preliminary Erosion Survey of California

The Regional Investigative Committee at its February meeting instructed Lowdermilk and J. W. Nelson, Assistant Regional Forester in charge of Grazing to make a preliminary survey of erosion for the State. After the Forestry Tour Sundling remained at Northfork to complete some work there. Nelson and Lowdermilk began a survey of the southern San Joaquin Valley.

Effects of fire and grazing separately and together were studied in a preliminary way in a number of areas southward along the foothills and into the mountains. It is impossible to conceive that a more devastating effect of over-grazing by sheep on a winter range can be found than exists 10 to 30 miles northeast of Bakersfield. The rainfall is low, and the vegetation has been so destroyed as to leave a naked landscape in which erosion gullies are rapidly forming. It presents a scene of diabolic desolation which becomes the Dark Ages rather than an age of enlightenment.

Among the general conclusions of the survey are the following:

1. Climatic conditions in the foothill region are unfavorable for soil culture without irrigation. Stock raising is the most reliable source of income. Farmers since the homesteading period of the 80's have one by one abandoned farms, leaving houses in ruins and fields in gullies and weed growth. Need of forage for cattle has induced the wilful use of or neglect of fire to burn the county over to open it up and to favor grasses. This epoch of fire is producing profound changes in the nature and distribution of vegetation. The effects of fire in this particular section require experimental study to determine the significance of the trend of consequences on the productivity of the region.
2. Fires in the forests and woodland areas have set in motion the destructive process of accelerated erosion, - an agent of ethnic suicide. Evidences of accelerated erosion were found in the shallowing of A horizons, in the development of erosion pavements, in exposure of roots, in gullies, and in spectacular depositions of sediments.
3. Trampling of grazing stock on burns was noted to be a serious agent of soil removal and of filling drainage channels with soil ready to be washed away by the next storm run-off.
4. The effect of fires on water supply or yield of water by streams is an intricate problem. Its effects on erosion and irregularity of flow have been pretty clearly indicated by experiment for certain conditions. But the effect on total yield of water requires determination under controlled experiment that a conclusion may be rendered.
5. One of the most important needs in studying problems of forest and land management, particularly in the foothills are exclosures to permit vegetation to respond to the present prevailing climate without interference from fire and grazing. The foothill region has been so run-over by fire that the original nature and potentialities of vegetation are unknown. Permanent exclosures of not less than 10 acres, preferably more are an important need in studies of the problems of this fire swept region.

Coordination of Forest Management and Forest Influences Studies

In the latter part of the month Lowdermilk accompanied Dunning to the Stanislaus center of work to consider in what ways the Station influences and erosion studies may be coordinated advantageously with Management studies. It becomes apparent that much is yet to be learned about the effect of cutting forest timber under the present day methods. Local climate in the forest is doubtless changed to a decisively critical extent which affects natural restocking as well as water yeild from winter snows.

Forests and Water

On the basis of recent tours of observation Lowdermilk has raised the question of the desirability of reconsidering the present timber cutting policy in the Sierras with the object of defining anew the limits of protection forests. Inaccessibility has been the chief reason for designating forest areas as protection forests. In the southern two thirds of the State of California water rather than timber is the most important product of the mountainous areas. The critical nature of the water supply in the San Joaquin Valley has placed a value upon water yield from the mountains far in excess of any other use such as timber, grazing, or recreation. The management of these areas properly should be for maximum beneficial water production.

Yet expensive and heavy cuttings are being pushed in these regions without an adequate study of the influences created by the opening out of extensive areas by heavy logging. The influence of logging by the present methods on water yield and supply is unknown. It appears certain that the clearing of wide areas and the exposure of snow blankets to the full effects of sun and wind produces important changes in the rate of melting. The effect of this on the utility of irrigation water is not known, nor is the extent of coordinate use of forests known. Likewise the enormous amount of debris of heavy slash, cull, and broken trees and logs which accumulate in drainage channels as a result of present day logging must retard the discharge of streams. This would be advantageous for flood control. But flood control within the snow zone above the 5000 ft. contour is not the most urgent objective. It is rather the rapid yield of clear water from melting snows.

If there were no impairment of the yield of beneficial waters, it is evident that logging under the present improved methods required by the Forest Service under the handicaps of present economic forces still falls far below a satisfactory practice of silviculture. Control of conditions favoring germination of seed and survival of seedlings is forsaken in the present necessity for large scale operations. This loss of control of silvicultural treatment necessitates reliance chiefly on advance growth in this region. Advance growth comprises chiefly the more tolerant and less valuable species of incense cedar and white fir. It is plain that we are not yet ready to cut many of the timber stands in the Sierras.

The situation is incomparably worse on the privately owned timber lands, where no attempts of silviculture are made. The recently heralded "selective logging" is a travesty on silviculture, despite all the encomiums.

A study is urgently needed to indicate the limits of protection forests for the primary purpose of preventing present cutting on all areas where there is a possibility of impairing water yield in quantity or character

until the influence of cutting the forest by various methods upon water yield is determined.

Restrictions found to be necessary would be applicable to both Federal and privately owned timber. If the findings justified important restrictions it is quite probable that State laws would be passed to enforce them. Despite claims made by lumbering interests of the value to the community of employment and purchases of supplies, the agriculturist supports lumbering as well as other industries. In the final analysis all things are purchased with food. The efficiency of the American farmer in producing enough food to release 70 out of every hundred to carry on industrial and other non-food producing enterprises makes possible our high standard of living. The emphasis should not be misplaced as has often been done. The interest of agriculture is primary and the highest objective in the management of mountain forests is to maintain them in a condition to serve the best interests of the irrigated fields in the valleys.

Exclosures

Natural and research areas within forest regions are of first importance for the prosecution of researches in forest influences and erosion affecting these regions. Fortunately, it is possible to find back in the mountains here and there suitable areas of high forest. It is of high importance that these reservations be made before further use or obligations are imposed on these lands. It will always be simpler and within possibility to reduce or to convert research areas, than to restore natural conditions.

In the woodland and grazing areas a different situation confronts the investigator throughout great areas in western America. Extensive grass and woodland areas which have been used heavily for grazing, and have been repeatedly swept over by fires and have suffered unknown damage and change. The danger of using an overgrazed or fire swept condition as a basis of comparison of management, rather than the natural undisturbed condition is ever present. Doubtless it is often employed. The highest interests of management and treatment of the foothill region of California, for example, requires the setting aside of areas from which all fires and grazing are entirely excluded. The damage to the soil profile, to be sure, may not be rectified for unknown periods of time. But at least processes of restoration of soil development, of recovery of the sensitive balance between vegetation, soil fauna, and erosional processes will be released in the direction of conservation, than of destruction.

Exclosures of this character should not be less than 10 acres in area. Small drainage units up to 200 or more acres are the desideratum. Without such exclosures systematically located forest research within these regions will be seriously handicapped in indicating the full potentialities of the region for its highest use to society. Larger research areas would be most satisfactorily in the woodland and savannah type, but difficulties of ownership will interfere. The loss of choice in the lower country should speed up the activities in setting aside research areas in the coniferous forests in the higher country.

Southern California
(May and June)

Accomplishments at Devil Canyon Nursery included potting of some 2000 trees, installation of 24 seedbeds, miscellaneous planting in the arboretum and in the Canyon, completion of a lath house 16 x 72 feet in size, continuance at odd times of the heavy task of screening the upper nursery soil, and beginning of the summer struggle with weeds not only in the nursery proper but throughout the station area. Early use of the Fordson tractor and a disk harrow in cutting numerous firebreaks seems to give promise of a more effective protection than we have had heretofore, but much hard work is still required to safeguard plantations since an exceptionally heavy weed growth has resulted this year from the late spring rains.

The problem of staining the lath house was solved by the use of a Hudson garden sprayer (two-gallon size) to apply the stain. The framework was cut, the lath panels were made up, and the whole was sprayed before erection. This method probably required more stain than the brushing method, but the saving in labor and the more thorough coverage more than compensated for the extra stain required.

En route to the Devil Canyon Branch early in May, Kraebel stopped in Santa Barbara to confer with Supervisor Boulden and County Forester Dunne regarding the Santa Barbara County cooperative appropriation for the Experiment Station for next fiscal year. On May 11 he attended the Los Angeles County forestry and conservation tour conducted by the County Agricultural Agent and briefly addressed the assemblage on the forestation aspects of the Station's activities in the south. Interest in tree planting in southern California is always present and is especially lively with farmers and ranchers who live close to the mountains.

At San Dimas Canyon Mr. Harvey Bissell made a strong plea for the use of small check dams in southern California watersheds as the most effective artificial means of flood control and water conservation. Not a theorist, Mr. Bissell supported his recommendations by citing the experience of his neighbor, a Frenchman, and himself in some canyons above La Crescenta where complete flood control has been brought about through the construction of a system of check dams. One essential to the success of the check dams is that the system must be complete, beginning with very small dams in the smallest tributaries and extending throughout the watershed to be controlled. In view of the abandonment of the San Gabriel high dam project and the extensive surveys now in progress in the San Gabriel watershed, conditions appear favorable for the adoption of the check dam method in place of the high storage dam method of flood control in this important river of Los Angeles County.

Products

At the end of June Brundage is still in Madison wrestling with the Holerith computation of the Pickering woods and mill study and the lumber stain study. He is expected to return early in July. Most of Hill's time this month has been absorbed by the pile of desk work accumulated since April and by administrative work in Kotok's absence. He carried out, however, two items of extension activity which may have some general interest.

Wood Utilization of California English Walnut.

Extensive areas of English walnuts orchards in southern California are being taken out because of the greater profit in citrus fruits. The growers, therefore, sought the help of the Station to find out whether the present vogue of walnut, especially in cabinet work, might not offer them a more lucrative market for their wood than that for fire wood. While in Chicago en route to the Madison conference, Hill saw the American Walnut Manufacturers Association, and, on June 1, while in southern California, visited the University of California Citrus Experiment Station and some of the disappearing walnut orchards.

The walnut manufacturers will use the wood, if material submitted can meet their minimum size specifications, which are:

Common logs	10" x 10'
Figured "	18" x 8'
Stumps	20" diameter

The low-branching, vase form of tree which has been standardized in California because of ease in picking fruits, seems, however, likely to thwart this superior realization from the wood. Director Batchelor states that in France and Italy the canny peasants provide in advance for this contingency, even though it may only be realized by their children or grandchildren, and trim their trees high enough to give lumber value to the trunks. In America, nobody contemplates such a far future as against immediate profit. But the contingencies of an unlooked for future may sometimes break upon the present ownership, as in the southern California case. It might be a profitable new thought for American orchardists in more places than California to consider whether or how far possible future wood value justifies their emulating European practice.

Surface Checking of Air-Seasoned Spruce

On October 1 last a shipment of green wide clear 1-inch Sitka spruce was received by an Oakland, California retail yard from Coos Bay, Oregon. After seasoning 7 months in yard piles under the relatively even temperatures of the San Francisco Bay region, the boards are found to have surface

checked, at least 30 per cent of them, distributed indiscriminately through the piles. They were found to be so badly checked, throughout both surfaces, that they can no longer be sold as clears and the degrade loss is around \$30 per M feet.

Inspection by Hill showed reasonably good piling practice and developed the facts that buyer and seller had had transactions involving similar stock over a period of some 10 years with no previous trouble of this kind; also that the stock had been held at the mill (in solid piles) only long enough to accumulate the amount of the order from the saws and had been shipped bulk-piled in boat hold with only a week transit time.

This seemed to rule out malpractice at either mill or yard, as a cause. Moisture sections cut from typical boards showed within 1/2 per cent of 12 per cent M. C. in every case, which is a remarkably even showing, as well as a remarkably low average for this climate. Stress sections were normal when cut, with a single exception in which the prongs at once became divergent. But in every case, within a few hours the prongs pinched in and remained so, showing a type of uneven moisture distribution, which, when produced rapidly enough as may easily occur in kiln drying, can be expected to be accompanied by surface checking, although it is not often so aggravated in air seasoned stock.

The question then was, could the air seasoning weather to which this shipment had been subjected be proved to involve conditions which could be considered to account for such a result. When put together, the record showed, beginning on October 3, a day after the lumber was piled, and thus covering the first and most sensitive period of its seasoning exactly a month, embracing four extremely high temperature waves of a few days each. Such a succession is most "unusual" for this region. Also coinciding with the end of this trying month came a heavy wind which raised the evaporation rate to some four times its normal height for 2 days. This was followed by a month, November, not remarkable in itself except that it was entirely dry, the winter rains then normally to be expected not commencing until December 12.

This being the record, which might legitimately be expected to cause surface checking, the lumber itself exhibiting all the conditions necessary to such a hypothesis and these conditions being explainable on no other apparent ground, the report was so framed. At any rate the report was accepted by all concerned, and stopped a controversy as to who was responsible which otherwise might have dragged into the courts.

Woods and Mill Study

An air mail memorandum from Brundage at Madison says that while there are still no results to publish in the Monthly Report concerning the values of Sierra pines, progress has been very satisfactory, for the 35,000 cards are all punched and partly verified. The instructions for sorting

and tabulating have been completed in so far as it is possible to carry them in advance of any machine summaries. Tabulating will be started as soon as the equipment catches up with prior commitments on the regular Laboratory work.

Depreciation Study

Mention was made last month of the beginning of tabulating on this project. With 25,000 cards to shuffle every time a new sort is called for, it was impossible to finish the job during the month, even though the machines were allotted to the depreciation study the greater share of the time. Brundage's time has been spent almost exclusively in the preparation of sorting instructions for this study, the woods and mill study, the lumber stain study, and the planer degrade study, consequently any extension analysis of completed summaries has had to go by the board.

Disliking to see this section of the report entirely barren, however, he has sent in an abbreviated analysis of one thickness of white fir lumber. White fir may not be of as particular interest elsewhere as it is to Region 5, but the detail followed in our depreciation study will at least be informative to those who are curious to find out what type of project we have been referring to under this heading in past reports.

Lumbermen have stoutly maintained that white fir "Goes all to pieces" if allowed to become thoroughly dry in the yard, but they have never offered any reliable data to substantiate their claims. Sad to relate, the figures below, although not bearing out the guesses of a more rabid yard foremen who estimate the downfall at 40 per cent or more, do show conclusively that losses in this particular thickness - inch boards - are decidedly heavy. The stock was piled somewhat better than the average and the drying conditions were not severe for California.

Air Dry 4/4 White Fir (Abies Concolor)
in West Side Sierra Foothills Region
Widths 4" to 12", Lengths 10 to 16 feet
Basis 2959 Boards

Original	Volume	Per cent of each dry grade after	Total
Green Grade	Inspected	re-grading for defects	Degrade
		C&Btr:1 Com:2 Com:3 Com:4 Com:5 Com:	%
C & Btr	6095 B.F.	76.6: 4.5: 4.0: 13.6: 1.0: 0.2	23.4
1 Com	1399 "	..: 77.4: 7.3: 14.8: 0.5: ..	22.6
2 Com	4056 "	..: ..: 60.8: 37.9: 1.1: 0.2	39.2
3 Com	10107 "	..: ..: ..: 83.4: 15.9: 0.7	16.6
4 Com	1775 "	..: ..: ..: ..: 94.6: 5.4	5.4

Similar information is in the summaries for each separate width but need not be presented here. The heaviest degrade was in the 8", 10", and 12" stock, as would be expected. Exactly what caused the degrade was also recorded, as well as the remanufacture to reclaim part of the downfall. The figures are admittedly incomplete without an account of how much was restored by remanufacture and a summary of values, but these items are buried somewhere in the accumulation and will have to await their turn. These figures are sufficient at least to show that actual degrade is severe. If the 1-1/2" and the 2" stock show the same tendency to deteriorate as the 1 inch (we'll tell you about that in the next issue) then the case of the lumberman vs. white fir looks bad for the defendant.

Planer Degrade Study

This study - which brings attention forcibly to the fact that the degrade above noted is only part of the whole - for practically all white fir is surfaced before shipping, - has been transferred to punch cards but not summarized. It involves about 2400 pieces of white fir, 6/4 dimension stock and 4/4 boards, mostly the former.

Lumber Stain Study

Card punching started about June 23. Instructions for sorting and tabulating are two-thirds finished.

Lumber Census

This job is all completed and preliminary summary could not be prepared except for the return of one company which is so big that the summary cannot omit it. The return for this company had to be made out in the company's eastern headquarters, and the local Census Chief Special Agent, instead of sending it to us, sent it directly to Washington. Since then nobody can find it, so we are still hung on a peg.

Entomology

Jeffrey and Durbrow spent the first three weeks of the month at Buck Creek on their chemical and H-ion concentration studies. Jeffrey is following the sugar concentrations of a number of artificially injured trees, and insect attacked trees to determine the reason for the attractiveness of such trees. Healthy trees are also being studied as checks and also to determine the natural seasonal variations. Durbrow is working out a method for determining, with a fair degree of accuracy, the pH of the inner bark of trees in the field. A set of color standards have been made up and sealed in glass tubes for use in the colorimetric method which appears to be more satisfactory for this work than the quinhydrone electric method which has also been experimented with. Now that the

methods have been worked out the pH of the inner bark of a large number of trees will be studied to determine the relation of growth rate and injuries to pH. They were at Hackamore the last of the month where a number of samples were taken from partially attacked trees and preserved for later analysis.

Person, Wagner, and Bacon spent the first part of the month at Buck Creek where the 155 trees being studied to determine the relation of fire injury to insect damage were reexamined and general insect conditions were determined by some preliminary check insect cruises. An examination of the logs being cut by the Crane Creek mill from trees killed by the Sugar Hill fire showed a rapid increase in the amount of blue stain and insect damage in the sapwood, since the first of June.

During the second week of the month most of the camp was moved to Hackamore where we expect to maintain a center of work for a number of years. A 12 x 14 laboratory for temporary use was built and tent platforms set up for living quarters. Water is being furnished by the Southern Pacific Company.

The last of the month was spent in setting up the dendrograph, dendrometer screws, insect rearing cages and other equipment and in insect cruises near Flag Springs and Timber Mt. The three experimental marking plots were carefully cruised and all newly killed trees were marked and examined. No trees with complete D. brevicornis attacks were found as the 1930 brood trees have not started to fade. All trees found had been attacked last fall by D. monticolae, Ips emarginatus, or both. A preliminary cruise of the Timber Mt. unit was made to determine the suitability of the area for an experiment in biological control. The boundaries of the main body of timber were run, the degree of isolation from the nearest adjacent stands and the amount of infestation in the area at the present time was determined.

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CENTRAL STATES FOREST EXPERIMENT STATION

General

Auten represented the Station at Mont Alto at the opening of the Pennsylvania Forest Research Institute. This Institute will be run in conjunction with the educational work at Mont Alto, making use of the tract of land which has been under management of the Mont Alto Forest School for a considerable period of years.

Weather conditions in the Ohio Valley have been very unfavorable for forest planting work this season. The region immediately bordering the Ohio River in southern Ohio, Indiana, and adjacent states have had a very low precipitation. The Station at Chillicothe, Ohio recorded the

lowest precipitation (.92) for the state during the month of May. This has been followed in the month of June by .29 inches. This has resulted from a condition of high air pressure which has existed over the southern Appalachian region rather continuously this spring, forcing the course of storms well to the north over the lakes. Southern Ohio is further unfortunately placed in that moist easterly winds lose their moisture in passing over the high mountains of West Virginia. This combination of circumstances has undoubtedly been an important factor in the extension of prairie areas across Indiana and into Ohio.

Oak Yield Study (TS-12)

Barrett has been engaged in the computation of yield data, part of which has already been forwarded to Washington. Barrett remeasured the chestnut-oak regeneration plots located about 25 miles southeast of Columbus.

Plantation Study (Fp-1)

Kellogg plans to use two parties in the extension of this study in Illinois and Iowa during the early part of the summer. One party was started under his direction in Iowa on June 20th. The second party will begin work on July 1.

Kellogg visited the Secretary of the Walnut Growers Association in Chicago to interest him in the production of a bulletin on Yield in Black Walnut Plantations. He found that the Association has little information bearing upon this subject since the walnut buyers have been chiefly interested in naturally grown walnut of large size.

Woodland Grazing (Pa-1)

Day began work in Indiana on June 20th. He has been supplied with a party of two temporary employees and is further assisted by Daniel DenUyl, a member of the staff of the Indiana Agricultural Experiment Station. Mr. DenUyl is interested in the study of the effect of grazing on the woods and is assisting in this study in cooperation with our Station.

Litter Study (M-1)

Auten began field work about June 20th with the assistance of two temporary employees. He plans to carry on the study of litter as a factor in growth and regeneration of the forest, confining his work for the current season to virgin stands of timber in Ohio and adjacent states.

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LAKE STATES FOREST EXPERIMENT STATION

The last quarter of the year was, as usual, devoted to winding up the reports of last field season's work and to organizing the work for the coming spring and summer.

The Station enters the new fiscal year with four research bulletins in press:

Second Growth White Pine in Wisconsin.
Soil Erosion in Wisconsin.
Forest Fires in Michigan.
Aspen in the Lake States, its Availability, Properties,
and Utilization.

The first two are coming out as research bulletins of the Wisconsin Agricultural Experiment Station, "Michigan Forest Fires" is being published by the Michigan Conservation Department, and the Aspen Utilization bulletin by the Agricultural Experiment Station of the University of Minnesota.

The Land Economic Surveys in Michigan, Wisconsin, and Minnesota claimed by far the greatest attention of the Station during the spring. In accordance with the policy agreed upon to utilize the already existing state economic surveys, preliminary to the Federal Survey of the Lake States region, the Station attached to each of the state surveys one temporary man. The state surveys were enlarged to include a timber survey covering both the amount of standing timber and its rate of growth. The method adopted is that of strip surveys, one chain wide, run at intervals of three miles. The field work this season is expected to cover about 600 miles of tallied strips which will include samples of the majority of the important forest types of the region. Along these strips sample trees are measured as to total height, total age, and diameter growth.

Although independent of the state land economic surveys but closely related to them, particularly Wisconsin, is the growth study of cut-over land. This study is stimulated and supported by the Wisconsin Conservation Commission, which in the operation of its forest tax law embracing now close to 400,000 acres, is seeking information on what the cut-over lands registered under the forest tax law are likely to produce in the course of the next several decades. It is not unlike the study made a year ago, the results of which are given in the technical bulletin "How Fast Do Northern Hardwoods Grow", but the method of approach this time is different from the one used in the study of the cut-over northern hardwoods.

Another independent study, but again closely related with both the forest surveys and forest growth study, is the project on correlation of forest types and sites with soil types. The object of this study is to

give the field men a key to soils by which they gauge the possibilities of forest growth.

Again to meet a very concrete problem for the state of Wisconsin, a study has been started on the best method of slash disposal. Last year the state legislature had before it a drastic bill for slash disposal. Much opposition has been developed on the part of the lumbermen to the drastic provisions of this bill and the bill finally has been withdrawn pending the results of a study to be made by this Station.

The usual remeasurements of reproduction plots on the Chippewa and Superior National Forests have been made during May and June.

In addition to the eleven permanent members of the staff, the Station has nineteen temporary field assistants, partly on the payroll of the Station and partly on the payroll of the cooperative agencies or in all thirty people in the field.

Another event that may be worth while mentioning is the Annual Meeting of the American Forestry Association which was held in Minneapolis on April 29 and 30. By testimony of people who were attending these annual meetings, the Minneapolis meeting was unusually interesting both because of the papers read and the people who attended it. Among the principal speakers at the banquet were President Glen Frank of the University of Wisconsin and President Coffman of the University of Minnesota.

NORTHERN ROCKY MOUNTAIN FOREST EXPERIMENT STATION

The annual re-examinations of the several thousand quadrats on our permanent methods-of-cutting and natural reproduction plots were commenced by Haid with two field assistants. Seedling germination was found to be well advanced, but because of the above normal rainfall and lack of excessively high temperatures during June spring mortality has not been great, in spite of the fact that germination began somewhat earlier than usual this year.

The spring examinations of these quadrats now demand at least six to eight weeks of steady work by three men, while the fall examinations require about half that time. The present examinations are showing that the heavy seed crop of last fall has resulted in an abundant germination of cedar and hemlock, considerable larch and Douglas fir, but a marked scarcity of white pine. On one Forest Service sale area the cedar and hemlock have germinated at the rate of from 80,000 to 100,000 per acre,

while new white pine seedlings amount to only 200 even where there are at least six excellent white pine seed trees per acre. The reasons for this departure from normal behavior remain to be determined.

Measurements of fire weather and forest inflammability were commenced on July 1 at all three stations (clear cut, half timbered and full timbered) at Priest River. Similar measurements on medium exposures also were commenced at six other stations in the region early in the month. Daily reports from about 10 forest stations to the Weather Bureau Office in Spokane, and forecasts from the Bureau to all fire forests began on June 16. The weather during the last eleven days of the month, however, changed the aspect of current fire danger, when all stations reported from four to nine rainy days, with Spokane receiving the record breaking amount of 1.38 inches in 24 hours on the 20th. This is the first June since 1923 for which Spokane has reported more than its normal monthly rainfall of 1.28 inches. Previous to that the last over-normal June for Spokane was in 1916. It is interesting to observe that both 1916 and 1923 were exceptionally easy fire seasons, but this does not warrant a forecast for 1930.

Correspondence with the Supervisors of the Beaverhead, Deerlodge and Helena Forests has resulted in the elimination of that region from the lightning storm study during the next few years, at least. None of these Forests have high elevation fire lookouts which can be used for obtaining observations on storms, and it is not believed that reports from rangers who are very busy on other work, often fighting fires or traveling extensively, are sufficiently accurate and complete to warrant the effort of collection of data. Furthermore, the lightning fire problem is not at all acute in the region represented by these three forests and the results of this study have been of much less value there than on the western fire forests.

During June the Station did preliminary work on a new and intensive study of Region 1 fire records embracing all aspects involved in securing the most effective fire control. The first steps have been the preparation of a tentative outline for the work, an examination of the coding and compilation methods used in R-5, and the preparation of a detailed list of the factors and conditions shown by the fire report (Form 929) which may be susceptible to coding and analysis. A conference is now planned with Regional Forester Kelley and others to decide upon the assignment of men to this project, to prepare a specific statement of the objectives of the work, to correlate this study with the transportation study, and to bring into the picture all of the best informed opinion available. Although special funds for this work are not available, the Region hopes to be able to assign one man immediately, and the Experiment Station work has been modified to make approximately half of Gisborne's time available during the coming year.

Weidman spent the last week of June in the field going over most of the project work with Haig and Thompson at the Priest River Branch. A stop was made in Spokane on this trip to confer with some cooperators there regarding Station work.

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NORTHEASTERN FOREST EXPERIMENT STATION

Early in June Behre and Westveld went to Twin Mountain, New Hampshire, to select areas for the new series of methods of cutting experiments in the spruce hardwood types to be laid out by Westveld this summer. This work was done in company with officials of the White Mountain National Forest, and soils experts from the Connecticut Agricultural Experiment Station, who have been cooperating with us for the past few years in studies of soil conditions and soil changes in the spruce types near Twin Mountain. Spaulding and MacAloney also went over the proposed area to check up on pathological and entomological conditions.

The new series of plots will combine the advantages of fairly large areas to give a representative picture of stand and growth with intensive plots to follow development of individual trees. Each plot measures 5 by 10 chains. The various plots in each series are contiguous to one another. A series of six plots has been laid out in the yellow birch sub-type, which is relatively easy to maintain in pulpwood producing species, and four have been laid out in sugar maple sub-type, in which it is difficult to maintain any large proportion of softwoods.

Each of these five acre plots will be split into thirds to vary methods of slash disposal. All trees over 4.6 inches will be tallied by species, diameter, and crown classes. Saplings below 4.6 inches will be tallied on strips covering one third of the area, and reproduction will be tallied by milacres on transects to cover three per cent of the area. On each five acre plot a representative $\frac{1}{4}$ acre intensive plot will be selected. On these all trees above 1 inch in diameter will be tagged and more intensive study of surface vegetation and soils will be made.

Another series of four plots limited to $\frac{1}{2}$ acre each because of local stand conditions will be laid out in pure, even-aged spruce to test the effect of partial cuttings in this type upon the development of the next crop.

Spaulding has started field work on his study of the deterioration of yellow and white birch, left after logging. He will study root conditions to determine just what part the shoe string fungus, Armillaria sp. plays in the deterioration of birch. Preliminary reconnaissance in company with MacAloney has revealed the fact that sun scalding of exposed roots is probably an important factor in the failure of the birch trees to maintain their vigor after logging. Very few trees were found infected with Armillaria which were not also attacked by the bronze birch borer.

V. A. Clements of the Washington Office, was in the Northeast for the month of June. He spent about two weeks assisting Jensen in the re-measurement of permanent plots in white pine at Peterboro, New Hampshire, and another two weeks with Westveld on the new Cherry Mountain plots in the spruce hardwood type.

Behre and Westvold spent two days in the Waterville Valley with Scott, Girard, Currier, and Salmond, of the Administrative Force, Mr. Adams, logging superintendent for the Parker-Young Co., now operating the Waterville timber sale area, and Mr. Cox, logging engineer of the Caterpillar Tractor Company, to study reproduction conditions on steep slopes of the upper spruce slope type, and to investigate the feasibility of logging these slopes with caterpillars equipped with a winch. The usual method of operation on these steep slopes where horses cannot be used is hand logging, locally known as "rolling." All merchantable growth is felled at right angles to the contours and trimmed to lie flat. The trees are then felled parallel to the contours, topped, and rolled down to the roads which are about 250 feet apart. This work is done on the snow in winter. Brush is left well scattered, but frequently very dense. Practically all advance growth over 2 feet in height is destroyed.

After comparing rolled slopes with similar areas where teams were used it was concluded that the method of logging is not a primary determinant of the character of reproduction as had been postulated by some in advance, but that the character of the new crop is dependent entirely on the amount and character of reproduction less than 2 feet tall on the ground at the time of cutting. In stands of overmature timber with thickets of advance growth from 1 to 2 inches in diameter as understory, the ground is left absolutely barren.

Mr. Cox believes caterpillars can be used to advantage, hauling the logs uphill to roads, reducing the destruction of advance growth of larger sizes, and requiring only about one third as much road building.

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PACIFIC NORTHWEST FOREST EXPERIMENT STATION

General

The annual meeting of the western division of the American Association for the Advancement of Science at Eugene was an important event. It was attended by Messrs. Munger, McArdle, Simson, and Isaac from the Station, and Mr. Keen from the Bureau of Entomology. The first and last named presented papers at a general session of the Division devoted to a tree symposium. The title of Munger's paper was "Ecological Aspects of the Transition from Old Forests to New", and Keen's paper "Forest Entomology in Western United States". Kotok was on the program with the title "Fire, A Problem in American Forestry", but in his absence McArdle delivered it. One of the sessions of the American Meteorological Society was devoted almost wholly to fire weather, and Mr. Simson had a paper on "Relative Humidity and Short-Period Fluctuations in the Moisture Content of Certain Forest Fuels".

State Forester F. A. Elliott, who was Oregon's first State Forester and has served since 1911, died early this month, and his funeral in Salem was attended by Messrs. Munger, Andrews and Cowlin of this Station. Mr. Granger was also there as one of the pall bearers.

Mr. Sol Reed of the Simpson Logging Company, a member of the Forest Research Council representing the Washington Forest Fire Association, was murdered June 23 by a logger.

An issue of Forest Research Notes was distributed to our stencil list of about 325. It contained four articles as follows:

- "The Survival of Douglas Fir Seed Trees"
- "Response of Forest Fuels to Changes in Atmospheric Humidity"
- "A Site Quality Classification for Western Yellow Pine Lands"
- "The Effect of Thinning Sapling Douglas Fir Stands"

Personnel

R. E. McArdle, who has been in Michigan on furlough the last three school years, completed his work there and returned to the Station early in June with the coveted and well-earned degree of Doctor of Philosophy.

The Station is employing field assistants this summer as follows:

- Wickliffe Litchfield, graduate of University of Minnesota, timber surveys.
- Harry Fowells, sophomore at Oregon State College, natural reproduction, fire studies, Wind River.
- Ralph Grant, senior at University of Michigan, fire studies under McArdle.
- Herbert Willison, sophomore at Oregon State College, yellow pine growth study under Meyer.
- Hugh Stuart, sophomore at Oregon State College, methods of cutting study under Kolbe.
- Robert Beeman, sophomore at University of Washington, yellow pine growth study under Meyer.

Forest Insurance

Mr. H. B. Shepard arrived in Portland June 23 after driving across the country to commence the forest insurance study of the Douglas fir region. He made a trip to Wind River to familiarize himself with the region, and he and Munger have made calls on certain of the protective agencies with whom cooperation must be had.

Natural Reproduction of Douglas Fir

The seedling loss from mice mentioned in the May report has continued and on some areas, particularly seeded sample plots, most of the 1930 Douglas fir seedlings have been eaten off. Poison was put out several times but was not entirely effective. On a seed tree survival plot at Westfir, Oregon on the Cascade Forest, the slash fire of October 21, 1929 was hot enough to melt the zinc tree tags. The fire was unusually hot for that season of the year; however, the melting of the tags was not altogether surprising since zinc melts at a little less than 800° F, and temperatures twice that high have been recorded on slash fires.

It is noticed that one of the Regions is recommending wire seedling markers upon which the date of germination is indicated by filing or chiseling a number of notches. Thus the year 1929 would require 11 notches. A system that this Station uses, which would seem to be far quicker both to install and to read, is to dip the wire markers (made of No. 9 telephone wire) to a depth of two or three inches in Rogers enamel, using a different color for each year. This enamel dries almost instantly, lasts a long time, makes the marker more conspicuous, and can be identified without close examination. If in addition the seedlings are to be numbered, the tip can be looped (by machinery) and embossing machine aluminum number crimped to the loop at a cost of about a cent per pin.

Methods of Cutting Yellow Pine

With field assistant Stuart, Kolbe visited the Malheur Forest to look over the Himes timber sale area for possible permanent plot areas. To date two plots have been tentatively laid out in nearly an even-aged "bull pine" stand. The area is well stocked with trees most of which are about 125 years old, although there are some mature and overmature trees scattered throughout and will be selectively cut soon. These two plots will make possible a study of the behavior of younger trees following cutting and a comparison of growth possibilities in even and uneven-aged stands. It is the intention to establish several plots in nearby overmature western yellow pine average of the timber in the sale area.

Yellow Pine Growth and Yield

The field work on this project commenced in two centers, under Meyer with two assistants in east central Washington, and under Kolbe with one assistant in the Blue Mountains of eastern Oregon. To obtain information on the number of years required to grow to breast height (since all increment borings have been taken at breast height), a number of seedling analyses were made near Crow Flat on the Malheur Forest by Kolbe. With the excellent cooperation of Supervisor Ewing who assigned two of his men to work with the Experiment Station crew, a quarter-acre plot in yellow

pine saplings was thinned of over 2000 trees so as to bring about a 6x6 spacing. All the trees reserved on the thinned plot were tagged and measured and a like number were similarly treated on an uncut control plot. In addition to the seedling analysis, twenty-six acres of virgin forest that had been marked for cutting on the Bear Creek sale area, were mapped as to tree distribution and the individual trees measured and classified.

Meyer has encountered an interesting condition in a yellow pine stand in central Washington where he intended to make growth studies. On an area severely defoliated by the larvae of the pine butterfly commencing about 1898, a considerable number of the trees were killed and on the surviving trees there seems to be a slight stimulus in the width of the growth ring immediately after the defoliation, followed by very narrow rings for several years. This effect of the defoliation in this region is quite disturbing to growth calculations for it is difficult to isolate the effect of selection cutting upon growth during the time that the defoliation was a factor. A secondary result of the infestation is the development of a dense apparently even-aged understory of saplings that developed thriftily following the killing of part of the overwood. Ring counts on this understory indicate that the seedlings originated prior to the infestation.

Fire Studies

McArdle resumed his fire studies on his return to the Station and will concentrate on the two projects that he has been devoting most of his time to the last two summers; namely, slash disposal problems in Douglas fir and the behavior of going fires. He visited the Guard Training Camp on the Mt. Hood Forest and intended to do the same for the Santiam Forest, but the meeting being postponed, he contacted only the local rangers.

Wind River

Practically the whole of Simson's time during the month of June was spent in the construction, testing, and installation of static meters. These meters, five in number, are being set up in the central dispatchers' offices on the Deschutes, Fremont, Whitman, Chelan, and Mt. Hood Forests. The meters will be tested to learn whether or not they are of value in indicating the possibility of local thunderstorms.

Forest Survey

Work on transcribing cruise data from the records of private owners was continued, and volume and type data for 327,000 acres of privately owned land were obtained during the month. In addition, type data for

552,000 acres of Northern Pacific lands were collected. At this time 60 owners of large blocks of land and many additional owners of smaller blocks have cooperated by furnishing their cruise data. So far the cooperation of private owners has been practically 100 per cent. While copying cruise data for private owners, their records on areas cut over have also been taken because the cut-over records as found in many of the county seats have been rather inaccurate. A conference was had with Director Jardine of Oregon Agricultural Experiment Station while Mr. Hartman of the Bureau of Agricultural Economics was here concerning means of arriving at the net area of land to be available for forest production.

Records from county offices, including location of areas cruised by the counties, areas cut over, and major ownerships have been copied for all but one or two counties in both States. The classification of all major ownerships in western Washington by counties and also by places of residence has been completed and letters requesting cruise data have been sent to all out of state owners and to a large number of local owners. Stripping of so-called agricultural townships in order to get their timber volume was continued in Yamhill county. A considerable amount of time has been spent in further experimentation with field procedure for old cut-over areas.

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SOUTHERN FOREST EXPERIMENT STATION

General

The month of June will be remembered for its unusually high temperatures and drought conditions throughout the South. Gemmer reports a maximum air temperature of 108.5° F in the shade at Camp Pinchot, Florida, and a maximum surface soil temperature of 146.5° F. The semi-drought conditions at Camp Pinchot were indicated by a soil moisture content of 1/2 to 2 1/2 per cent at a depth of 18 inches. At McNeill, Mississippi, it was said to be the driest spring in 50 years.

Professor Ralph Hayes of the School of Forestry, North Carolina State College of Agriculture and Engineering, again joined the Station staff as temporary assistant, marking his fifth successive summer in this capacity. He has been assigned to the Financial Aspects study of a county in southern Arkansas.

Management

Gemmer, Chapman, and Meginnis spent the major part of the month establishing a method of cutting study in virgin longleaf pine on the Niceville District of the Choctawhatchee National Forest, Florida. Six plots

measuring 3.6 acres each were laid out with a chain wide isolation strip. Plot 1, clear cut in alternate strips (1 chain wide); Plot 2, 3 to 5 seed trees per acre were left; Plot 3, 8 to 10 seed trees per acre were left; Plot 4, check; Plot 5, light shelterwood cutting, leaving 40 to 45 trees per acre; Plot 6, clear cut. This area will be planted to longleaf. All trees were mapped and those to be left were numbered, described, and tallied. Reproduction quadrats were also established and the reproduction mapped.

Protection, Fire

Possin and Craig examined the two fire plots established last fall and winter at McNeill. A 1/8 acre plot was burned over during a dry period during 1927. The other, a 1/4 plot, was burned over in January, 1930.

Both of these plots are located in an area which had not burned since 1923. The grass cover was largely broom grass and formed a very dense, highly inflammable mat. The object of these experimental fires was to determine the damage which might be caused by an accidental fire under similar conditions. The following table indicates the damage caused by these two fires as correlated with weather conditions.

Height or D.B.H.	Per cent of total trees of each size			
	Killed		Injured	
	Fall burn	Winter burn	Fall burn	Winter burn
Height				
6'	100	85	0	0
1'	100	85	0	0
3'	100	..	0	..
4'	100	50	0	0
D.B.H.				
1	97	2.5	25	2.5
2	74	0	26	5.8
3	29	0	71	0
4	39	0	62	0
5	15	0	85	0
6	14	0	86	0
7	25	0	75	0
8	0	0	100	0

The relative humidity during the fall burn was 41 per cent and the air temperature 69° F; during the winter burn the relative humidity was 100 per cent (heavy fog) and the temperature 55° F. It is of particular interest to note the difference in the effect of these two fires on similar areas but occurring under different weather conditions.

Measurements of the penetrability of the surface layer of the soil were made on the fire and grazing plots at McNeill, Miss. Soil on the unburned and ungrazed area was found to be four times as penetrable as the burned and ungrazed area, about five times as penetrable as the unburned-grazed and twelve times as penetrable as on the burned and grazed plots. Trampling by cattle (one steer to $7\frac{1}{2}$ acres) evidently affects the penetrability of the soil surface layer about as much as fire alone, while the combined effect of fire and grazing is nearly three times as great as either fire alone or grazing alone.

Rudolf spent most of the month in working up the data on the Raiford fire plots covering the first six years and wrote a progress report on the experiment.

Protection, Animals

Pessin and Craig spent the major part of the month on the regular reexamination of the longleaf fire and grazing plots at McNeill, Miss. Although a fairly hearty seed crop was expected last fall, relatively few 1929 longleaf seedlings were found on the entire 320 acres examined. The prevailing low temperature of last winter may have had the same influence on the 1929 longleaf seedlings as had been found at Urania, Louisiana.

Pessin and Craig laid out several quadrats for the study of succession of vegetation on both the burned and protected areas at McNeill, Miss.

Forestation

Wakoley spent the major part of the month at the office checking punch cards against field notes for the Bogalusa plantations.

Naval Stores

This year for the first time face heights and widths were marked on all trees (about 3700), the face heights being marked for the mid-season streak as well as for the final streak. This was an enormous task last spring but has proved well worth while for it has made the chipping supervision much easier and at the close of the year all groups will be chipped exactly as specified.

Miss Chamberlin has been able to enter most of the dip records on the permanent sheets for this year as well as catch up some of the records for 1928 and 1929. A large share of her time this month was used in making computations for the Naval Stores bulletin and the progress report for the Raiford fire plots.

Harper and Averoll looked over Georgia timber land for prospective experimental forests. Of the nine tracts of land examined only one had any considerable amount of round timber suitable for immediate turpentineing. The tracts that have been under fire protection for the last five years or so have an abundance of small trees from 2 to 4 inches and should be ready for turpentineing in 10 to 12 years. They also visited the thinning plots established by Righter in 1929 in cooperation with Dr. Cary. They also looked over several thinning experiments established by Dr. Cary on various private timber land holdings.

Harper revised and put in final shape a progress report on the French face experiments. A short article on "Mortality in Second-growth Pine in the South Caused by Turpentineing" was also prepared.

A daily chipping experiment was started on the Kingsley tract this month. Thirty trees selected from the isolation strip of the Kingsley thinning plots are to be chipped once a week with the regular French face chipping tool and are to be scraped four or five times a week with a boat deck scraper. This scraper takes off very little wood and requires but little time to freshen the streak.

Pessin translated a naval stores publication from the Russian entitled, "Scientific principles for the technique of chipping pine trees". This paper was published by L. A. Ivanov of the Forest Research Institute of Leningrad and comprises a monograph on naval stores. It discusses in detail published and unpublished work on the anatomy, physiology, and ecology of the resin duct and the environmental factors affecting yields of gum from pine.

Sinclair and Lentz started mapping representative areas on which gulley control work will be carried on by the Mississippi Extension Forester and county agents in August. A contour map with five foot intervals was made of two areas of 200 and 80 acres, respectively. Cover types were indicated and all gullies and breaks were carefully mapped. With a planimeter the area taken up by the gullies as well as the area of each type of land will be determined. These figures converted to percentages can later be applied to the total area in the uplands, as the areas studied are typical of conditions found in that region.

The Second Southwest Soil and Water Conservation Conference was held at the Oklahoma A. & M. College at Stillwater, Okla., June 19 and 20. Lentz attended the meetings and presented a paper. Very few of the erosion studies carried on by the Bureau of Chemistry and Soils have considered the reclamation of very badly gullied and eroded lands through reforestation, such as by planting black locust on the gully banks. At Guthrie and Stillwater, Okla., some very interesting experiments in terracing cultivated land are being carried on.

Economics

Dr. Ziegler and Spillers spent the major part of the month at the office working on the Appling County (Georgia), Lee County (Alabama), and Washington County (Florida) reports. In the following table he reports an interesting comparison of conditions found in the four counties studied to date:

Bond accompanied Hayes to Hempstead County, Arkansas, where they began an economic study of forest conditions in the county, in cooperation with the University of Arkansas. The balance of the month Bond continued working on the Beaufort County (North Carolina) report.

The average run of southern pine forest lands are not in shape for high production.

1	2	3	4	5	6	7	8	9	10	11	12
County	State	Part of County in woodland Per cent	Part of woodland owned by Farmers (1925) Per cent	Chief Species of Pine	Chief Forest Products	1929 forest income per acre Gross dols.	forest income per acre net dols.	Average net income for next 30 yrs. (based on 1929 values) dollars	Av. 1929 forest land tax per acre dollars	Part of av. net income taken by taxes Per cent	Gross forest income as a percent of gross farm inc. per cent
Alcorn	Miss.	40	70	shltf.	Short dimension lumber	4.50	.81	.51	.13	25	22
Appling	Ga.	56	62	(slash lglf. shltf. lob.	naval stores, lumber, ties "Roofers" lumber	4.93	1.11	.75	.16	21	74
Lee	Ala.	25	45	lglf. lob.		5.77	1.51	.64	.15	23	27
Washington	Fla.	84	16	lglf. lob.	lbr., naval stores	2.10	.41	.25*	.25	100	80

- (7) Gross forest income (mostly pine, but other species included) includes lumber, f.o.b.mill, naval stores f.o.b.still. Fuel wood not included.
- (8) Net forest land income before taxes - fuel wood not included.
- (9) All counties show excessive utilization in 1929. This column deducts depletion and appraises increment at 1929 prices. This is based on present abused forest land and is no measure of the potential income of this land if wisely protected, and managed. The potential income is 2 to 5 times this sum.
- (10) Average forest and land tax per acre for county.
- (12) Shows relative gross income from forest, compared to agriculture.
- * Washington Co., Fla., has one half of its forest land in cut-over longleaf sandhills reverting largely to scrub oak. This, with the greatly deficient young growth, accounts for future low net income. In 16 years this county will be in serious financial difficulty. This county is the only one of the 4 showing a serious tax delinquency problem - a sample of Florida forest lands generally.

SOUTHWESTERN FOREST EXPERIMENT STATION
(May and June)

Substantial progress has been made on a number of field projects. One section of the experimental forest has been mapped by Hornibrook assisted by Osborn. Krauch and Hornibrook left for the Lincoln on June 16 to remeasure the Douglas fir sample plots. Examinations and recounts have been made on a large number of seedling plots on which records have been kept since 1919. Repeat photographs have been made on sample plots established in 1909.

Of special interest is a series of plots established in 1928 for the purpose of determining the effect of grass competition upon the survival of western yellow pine seedlings. The series consists of two control plots, one burned in 1928, one denuded, and three clipped three times during the season to 2, 6, and 10 inches respectively. All were sown with the same amount of seed. No germination took place in 1928 and therefore the plots were reseeded in June, 1929. Excellent germination followed the 1929 sowing. Rodents were excluded from one series of plots and a similar series was left open to rodents but closed to cattle and sheep.

The most immediate result was the sharp contrast between rodent-excluded and unprotected plots: the former had from three to five times as many seedlings as the latter at the close of the germination period. Germination records showed no other consistent difference between the several treatments.

Moisture conditions were excellent throughout the summer and fall. On October 24, a month after all herbaceous vegetation had been killed by frost, the surface of the soil was still moist from the heavy rains in August and September. The dead grass (*Festuca arizonica*) on the unclipped plots stood from two to three feet tall. Some seedlings were found in the grass tufts but most of them were in the small open spaces. The late fall and early winter were dry. No snow fell until the middle of January.

Counts on May 30 revealed rather unexpected relations. It had been supposed that the tall grass would act as a protection to the seedlings during the dry early-winter months. But the survival between October 24 and May 30 was almost inversely proportional to the height of grass. Both inside and outside the rodent proof fence the number of seedlings and the per cent of survival were much higher on the denuded plots than on any other. The 2-inch clippings were next in order. The control (unclipped) plots and the burned plots were at the bottom of the scale. One of the burned plots bore the heaviest cover of grass in the entire series.

The explanation of the differences in winter killing evidently is to be sought in conditions during the growing season of 1929 rather than in the winter conditions. A clue is furnished by a little experiment in the station nursery, in which western yellow pine seedlings and 3-year old transplants were grown without root competition in full sunlight, 1/2 shade and 9/10 shade. The heavily shaded plants appeared abnormally slender in the fall of 1929. When the snow had left the ground in April, 1930 every seedling and transplant in the 9/10 shade was dead. It is practically certain that the seedlings on the grass plots did not suffer from deficient soil moisture because the ground, even on the surface, was moist continually from the time of germination until all herbaceous vegetation had been killed by frost. The tall dead grass should have been beneficial rather than otherwise, by retarding transpiration and soil evaporation during the dry months of November, December and early January. Is it possible that solar radiation during the growing season can be a factor?

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BRANCH OF RESEARCH - REGION 2

During the first decade of the month all members of the Experiment Station staff were located at the Fremont Station. Leadbeater worked with Williamson to push to completion the season's cutting budget on the experimental demonstration forest. He also spent some time in counting out germination lots for the Holy Cross Douglas fir and White River Engelmann spruce seed production studies. In between periods, he was called upon to assist Williamson and temporary help in rebuilding the 6600-volt power line which brings electricity to the Station and the light system line inside the administrative area; both of which were in bad condition and in urgent need of attention.

Prior to his transfer on the 12th to project timber-sale work on the Colorado Forest, Leadbeater completed the compilation of the 1929 meteorological records in the local type study.

Roeser's time during the fore-part of the month was given almost exclusively to weighing the oven-dried representative seedlings and transplants in the various western yellow pine and Douglas fir seed source and inheritance studies, involving both Fremont and Nebraska problems. A large mass of material was included and no time was found to summarize the results obtained from this analysis.

The second decade (11th to 21st) was spent by Roeser in remeasuring two blocks of sample management plots in the Engelmann spruce type on the Cochetopa Forest. He also took time to inspect progress made by local officers on the same Forest in carrying out the provisions of the detailed

working plan prepared in 1926 to study the effect of various thinning methods, based on the utilization of tie and prop size material, in stimulating growth in stagnated lodgepole pine pole stands. This latter problem concerns itself chiefly with (a) improving the condition of these stands on heavy lava soils where, presumably because of adverse soil conditions involving its physical character, height growth abruptly ceases at a relatively early age and stagnation sets in at about 50 years or before depending upon the density of stocking or (b) replacing the lodgepole with Douglas fir, which appears to be better adapted to the sites in question. In addition to the silvicultural aspect, there is an economic one, which cannot be dissociated entirely from a consideration of the problem under study.

Under favorable economic conditions such as have existed at times in the past, the continued production of lodgepole, under proper management, for small size material is probably to be desired from a revenue-producing standpoint; therefore, the reason for attempting to determine to what extent the rotation period may be reduced. In the absence of an immediate economic stimulus, and the necessity for considering the problem in its relation to future timber production, the possibilities of converting the stand into one in which the supposed climax species is dominant should receive just as careful study.

The original plan called for the installation of seven blocks of two plots each in stands representing various degrees of stocking and development. Four of these have been installed and data on growth following thinning and the development of planted Douglas fir are being procured. The completion of preliminary work on two other blocks will probably be accomplished by the administrative force within another year. Since with this addition, the administrative research load will be about as heavy as the Forest can efficiently carry, the balance of the program will be dropped for the time being.

In addition to the above group of plots within the Longbranch soil-type region, four other thinning plots are being studied at widely scattered points on both sides of the Continental Divide, chiefly on granitic soils. The remeasurement of one of these (Indian Creek Plot) yielded some striking evidence of lodgepole's ability to recover on light (granitic) soils after many years' suppression. The stand was cut-over, under an open shelterwood system, ten years ago at an age of 175 years. Approximately 80 trees were left per acre. Stagnation had set in at the age of 75 years so that the stand had endured a period of suppression lasting practically 100 years. Borings indicated that renewed growth following release started about four years after cutting, and that the rate of growth during the past four years had been stepped up from approximately one inch in 40 years to one in twelve.

The first of the two blocks of cutting plots in the spruce type which was remeasured was the old Leadville group of four plots on the east slope of the Continental Divide. Representing site quality I in spruce, three of the four plots have yielded during the past decade the highest volume of

gross increment of any plots in the Central Rocky Mountain Region. Since 1924, increases of 0.8 to 1.0" in d.b.h. were not uncommon. While the present plot volumes based on the recent remeasurement have not been calculated, it is estimated that increments on Plots 1, 3 and 4, during the five year period, will approximate the figures for the period 1919 - 1924, when they were respectively 270, 183 and 133 bd. feet per acre for stands representing 85, 30 and 70% of the original basal area present. The alpine fir, if anything, surpasses the spruce in rate of growth under practically all conditions of cutting, but it is suspected that much of the volume increase in this species is offset by decay.

The other series of spruce plots are located in the Marshall Pass country, some 70 miles south of those just described. They were laid out in an overmature stand of almost pure Engelmann spruce in 1924, on the western slope of the Continental Divide in the expectation that the plots would be promptly cut over. This, however, was not done. Remeasurements were, nevertheless, made on the two plots which were installed and it is planned to keep a continuous record of growth under virgin conditions until such time when it is possible to apply the axe to the stand. The opportunity is here afforded of comparing the growth of trees marked for removal and those to be eventually retained as growing stock.

Following his return to Colorado Springs, Roeser spent a few days in cleaning up various matters of administrative nature in the Colorado Springs office before going up to the Fremont Station. The last two or three days here were spent in making the final spring counts in the Douglas fir, western yellow pine and Engelmann spruce flower and cone production studies which are being carried on in the locality of the Station. The heavy destruction of Douglas fir flower and vegetative buds by winter-killing and by spring freezing, above approximately 9000 feet, is substantiated by the almost total absence of new shoots on trees of this species. The same condition does not prevail in the two other species mentioned. Whether this is due to more thorough insulation of the buds of these species against low temperature injury, or to a condition involving a fatal temperature or moisture reaction following inception of physiological activity in the buds of the early sprouting Douglas fir is now known.

The last heavy western yellow pine cone crop was produced in 1927, so it is entirely in line with this species' seed production habits to note the development of a very large crop of flowers this spring. During the course of the summer, an effort will be made to study in detail the circumstances affecting development of the new crop of cones and the rate of mortality among these. No results have been obtained to date in trying to tie in cone production with weather conditions, and in view of the large crop of flowers produced in the face of an extremely adverse spring, it appears that any relationship which may exist between these two conditions is of rather inconsequential nature.

July Plans

It is planned to give the entire month to the natural reproduction phase of the cutting methods study in Douglas fir at Fremont. This work was scheduled for last year, but had to be postponed in favor of activity in more important projects. If time is available, additional individual reproduction sections will be laid out in typical areas under management in the Fremont demonstration forest. A brief trip to the South Platte grazing reproduction plots is scheduled at the close of the month to check up on the erosion feature of the study.

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MANUSCRIPTS

Research, Region 2

Resistance of Seedlings to Excessive Heat. Jacob Roeser, Jr.

Southwestern

Review of Flowers and Flowering Plants by Raymond J. Pool. G. A. Pearson.
(For Jour. of For.)

Winter killing of Evergreen Plants. Review of German article by Dr.
Heinrich Walter. Hermann Krauch (For Jour. of For.)

Root Competition and Shade. Review of German article by L. Fabricius.
Hermann Krauch (For Jour. of For.)

The Determination of Increment in Cut-over Stands of Western Yellow Pine in
the Southwest. Hermann Krauch (For Jour. of For.)

Lake States

Soil Erosion in Wisconsin. C. G. Bates and O. R. Zeasman. (To be pub. as
Wis. Agr. Expt. Station Bulletin).

Appalachian

Acorn storage in the Southern States. C. F. Kerstian (For Jour. of For.)

In Print

- Bates, C. G. The Frost Hardiness of Geographic Strains of Norway Pine (Jour. of For. March 1930)
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- Hatch, A. B. The Sweden we Heard of at Idaho. (The Idaho Forester, 1930).
- Isaac, L. A. Northwest Scene of Active Forest Planting. West Coast Lumberman. May 15, 1930.
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OFFICE OF FOREST PRODUCTS - REGION 1

Woods and Mill Studies - A Comparison of the Amount and Value per M of the Products of Logs of the Same Dimensions and Position in Tree cut from Western Yellow Pine Trees of Different Diameter.

The question as to whether top logs of the same dimensions cut from trees of different diameters produce the same amount and quality of lumber has always been a point of interest in woods and mill studies. The same question applies also to butt logs. In order to obtain some information on this question, a brief analysis was made of the 625 western yellow pine trees included in the Woods and Mill Study of 1928.

The following detailed data were recorded separately for all 16-foot sound top logs 7, 8, 9, and 10 inches in top diameter: d.b.h. of tree from which cut, taper, scale, lumber tally, log grade, and footage by grades. The same data were recorded in the same manner for all 16-foot butt logs 11, 12, 14, 15, and 16 inches in top diameter. The value of the products per M, both log scale and lumber tally, was then determined for all of the log classes. Lumber tally, overrun per cents, and values were then curved to more accurately indicate the trend.

The following table shows some of the results obtained:

			: Lumber: Over-:			Value per M (\$) °			
Tree	:	No.:	Taper:	Net	:	Tally:	run	:	
D.B.H.: of			:	Log	:	#5 &	:	% #5:	
(inc): Logs: (ins):			:	Scale:	:	Btr. &	:	Btr: Log Scale:	Tally
			:		:		:		

16' - 11" - Butt Logs (Sound)

12	:	2	:	2.0	:	70	:	84	:	20	:	\$39.10	:	\$46.90:	\$35.00	:	\$39.00
13	:	4	:	3.2	:	70	:	78	:	11	:	31.23	:	34.65:	34.20	:	40.10
14	:	7	:	3.3	:	70	:	87	:	23	:	34.00	:	41.80:	33.00	:	41.00
15	:	1	:	4.0	:	70	:	98	:	40	:	26.62	:	37.25:	29.75	:	38.70
16	:	1	:	6.0	:	70	:	89	:	37	:	27.90	:	35.40:	26.50	:	35.95

16' - 16" - Butt Logs (Sound & Defective)

17	:	1	:	3.0	:	160	:	149	:	- 6.9:	\$29.32	:	\$27.30:	\$29.30	:	\$29.00
18	:	3	:	2.0	:	143	:	150	:	4.9:	29.43	:	30.85:	29.55	:	30.70
19	:	10	:	3.5	:	158	:	167	:	5.5:	31.51	:	33.25:	31.25	:	33.75
20	:	16	:	4.1	:	158	:	177	:	12.0:	36.47	:	40.85:	35.10	:	39.30
21	:	7	:	4.6	:	143	:	187	:	28.2:	34.23	:	43.90:	35.40	:	40.80
22	:	7	:	6.7	:	159	:	166	:	4.5:	33.67	:	35.20:	34.25	:	40.35

16' - 7" - Top Logs (Sound)

12	:	1	:	2.0	:	30	:	18	:	- 40	:	\$21.75	:	\$13.05:	\$24.50	:	\$19.60
14	:	2	:	3.0	:	30	:	31	:	2	:	27.19	:	27.70:	23.60	:	22.00
15	:	1	:	3.0	:	30	:	24	:	- 20	:	21.50	:	17.20:	22.70	:	21.95
16	:	1	:	3.0	:	30	:	32	:	7	:	22.82	:	24.40:	21.15	:	21.15
17	:	1	:	4.0	:	30	:	37	:	23	:	19.56	:	24.05:	19.60	:	20.25
18	:	1	:	3.0	:	30	:	18	:	- 40	:	18.61	:	11.15:	18.55	:	19.80

16' - 7" - Top Logs (Sound)

12	:	1	:	1.0	:	40	:	53	:	33	:	\$25.78	:	\$34.30:	\$27.35	:	\$32.10
13	:	5	:	1.6	:	40	:	47	:	18	:	28.57	:	33.70:	26.30	:	30.90
14	:	3	:	2.0	:	40	:	47	:	18	:	22.02	:	26.00:	25.60	:	30.10
15	:	2	:	2.0	:	40	:	47	:	18	:	25.00	:	29.50:	25.20	:	29.60
16	:	2	:	3.0	:	40	:	77	:	93	:	26.05	:	50.20:	25.10	:	30.10
17	:	5	:	3.5	:	40	:	53	:	32	:	23.25	:	30.70:	24.85	:	31.10
18	:	2	:	2.0	:	40	:	46	:	14	:	25.06	:	28.55:	24.40	:	32.35
19	:	7	:	3.6	:	40	:	60	:	50	:	24.23	:	36.35:	23.95	:	34.70
20	:	2	:	3.5	:	40	:	64	:	61	:	22.62	:	36.40:	23.55	:	36.50
21	:	1	:	3.0	:	40	:	62	:	55	:	23.77	:	36.80:	23.20	:	37.70
22	:	1	:	5.0	:	40	:	72	:	80	:	23.47	:	42.20:	22.90	:	39.50
23	:	1	:	6.0	:	40	:	84	:	110	:	21.53	:	45.20:	22.75	:	40.95

° - Values based on W. P. M. A. 1928 Pondosa Pine prices.

Based on the curved figures the comparisons indicate the following trend in values per M feet log scale:

Butt Logs.

The 11" butt logs increase in value in trees 12" in d.b.h. up to 14" and then decrease rapidly up to the largest tree (16") in which they occur.

The 12" butt logs increase in value very rapidly in trees 13" up to 18" d.b.h. These are the only tree diameters in which they occur.

The 14" butt logs increase in value rapidly in trees 16" up to 20" in d.b.h. These are the only tree diameters in which they were found.

The 15" butt logs increase in value in trees 17" up to 21" d.b.h. These are the tree diameters in which they were found.

The 16" butt logs increased in value from the 17-inch up through to the 22-inch d.b.h. tree in which they were found.

Top Logs.

There was an increase in the value per M of the 7" top logs in trees 12 to 14 inches in d.b.h., and then a decrease in value in trees up to 18 inches, the largest tree from which a 7-inch top log was cut.

Top logs 8 inches increased in value in trees 15 to 18 in. d.b.h. and then decreased rapidly in value. A 25-inch tree was the largest from which a top log of 8 inches was cut.

Top logs 9 inches decreased in value in trees 12 to 15 in. in d.b.h. and then increased rapidly up to and including the 25" tree.

Top logs 10 inches decreased in value in trees 16 to 19 in. in d.b.h. and then increased rapidly in value in trees up to 25 in. the largest tree from which they were cut.

The taper varies greatly in logs of the same dimensions and position in the tree cut from trees of different diameters. The amount of lumber that can be cut from a log of given size increases rapidly with the taper.

Woods Utilization Studies

Mr. I. V. Anderson, accompanied by Field Assistant Wm. Ibenthal, left for the summer's field work on June 13. Mr. Anderson plans to first complete the field work on the breakage loss in felling (summer conditions)

in white pine type before moving into the larch-fir type for similar studies. Field work on the survey of waste after logging in the larch-fir type will also be completed during the early part of the season. Later in the summer Mr. Anderson and his assistant will spend some time in the lodgepole pine forests of eastern Montana on utilization studies.

Census

During the period from June 1 to June 23 over 100 returns were obtained from Idaho and Montana delinquents as a result of field work by Whitney and other Forest officers holding appointments as special agents of the Bureau of the Census. At least 25 additional reports were obtained through personal letters mailed to other delinquents in the early part of the month.

One consignment of completed schedules including returns from 96 concerns edited by Whitney prior to his field trip was mailed to the Forester on June 17. Approximately 125 schedules including all of those submitted by special agents on the Forests and now on hand in this office will be rechecked and tabulated before they are forwarded to Washington. It is estimated that there are also about a dozen cases requiring additional follow-up before the canvass can be closed. A number of these delinquents are operators who could not be located during the past month. In a few instances operators listed as delinquent may have mailed their reports direct to the Bureau of the Census. For example, the Anaconda Copper Mining Company which is one of the largest establishments in Montana, claims to have prepared reports covering sawmill operations at Bonner and Milltown, but the schedules have not been received in this office.

Lodgepole Pine Utilization Study

After collecting delinquent census returns from a number of Idaho concerns in the vicinity of Spokane, Whitney spent the last week of June visiting the Whitman and Deschutes National Forests in Oregon. Some of the most extensive stands of lodgepole in Region 6 are to be found on these two Forests.

The principal object of this trip was to supplement the information previously contributed by Mr. Gibbons of the Products Office at Portland by personal interviews with the local Forest officers and timber operators. Also to become somewhat familiar with the characteristics of this species in Eastern and South central Oregon as compared with that grown in the Rocky Mountain Region.

A two-day field trip was made with Lumberman George Donaldson through some of the best stands of lodgepole pine timber in the Sumpter, Desolation and Austin Districts of the Whitman Forest, including a visit to a cut-over

area near Prairie City where a considerable quantity of lodgepole had been manufactured into box shooks several years ago. Some very interesting information concerning lodgepole utilization practices and possible uses was also obtained from Lumberman Perry of the Deschutes Forest and Mr. Ben Hamilton of the Shevlin-Hixon Lumber Company at Bend, Oregon.

Upon returning to Spokane on June 30, Whitney spent part of a day with officials of the Washington Wood Preserving Company at the Hillyard treating plant. These men are very much interested in the possibility of establishing a market for treated lodgepole pine poles and posts. The superintendent of this plant, Mr. A. J. Doyle, stated that 2,500 7"-25' lodgepole pine poles from northwestern Montana were given an 8-lb. per cubic foot full-length pressure treatment with a 50-50 creosote-petroleum mixture in 1929 for the Great Northern Railroad. About 200 of these poles still on hand at the treating plant show a complete sap penetration by the Rueping process.

It is understood that some lodgepole pine ties have been treated at this plant for the S.P. & S. Railroad and Mr. Doyle suggested the possibility of material from the Deschutes Forest eventually coming into the plant for treatment.

The Washington Wood Preserving Company has already treated a few lodgepole pine posts experimentally and is now cutting 1,000 round lodgepole pine posts of various sizes from private lands about 30 miles north of Spokane for pressure treatment.

Lumber Prices and Movement

Av. Mill-Run Prices	Annual, 1928	Annual, 1929	1st Q., 1930	April, 1930
Idaho White Pine	\$31.09	\$34.44	\$35.33	\$34.38
Western Yellow Pine	24.51	26.17	24.57	23.77
Larch-Fir	18.55	20.29	18.35	19.03
White Fir	18.26	20.94	19.45	20.26
Spruce	23.20	24.23	23.51	22.66

Shipments and Cut

	1929	1930
Shipment	170,664	125,872
Cut	174,850	168,485

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OFFICE OF FOREST PRODUCTS - REGION 6

Felling and Bucking Study, Douglas Fir Region

Spelman and Johnson spent the bulk of their time on this study; the first half of the month at the Long-Bell Lumber Company's operations at Ryderwood, Washington. The study at this camp comprised one plot of 3.56 acres, with a stand of 79 Douglas fir, 51 hemlock and 19 snags. On the basis of the fallers' pay scale, which did not include broken material nor unmerchantable tops, the scale of the timber in the plot was 537,683 board feet - Douglas fir 473,204, and hemlock 64,479 board feet; the pay scale is based on the Columbia River log rule. The Douglas fir ranged from 19 to 82 inches D.B.H. and 210 to 260 feet in height, with the bulk of the trees ranging from 45 to 64 inches D.B.H. and 225 feet high. The hemlock which comprised the understory, ranged from 15 to 48 inches D.B.H. with an average height of about 160 feet. The Douglas fir averaged about 365 years old and much of it was decadent and over-mature.

Although the breakage in the timber on this area has not been analyzed, it was interesting to note the great variation in breakage in individual trees of relatively the same size. In trees of about 50" D.B.H., the breakage ranged from 4 to 48 per cent of the merchantable gross log scale of the tree.

Generally speaking, loggers feel that the two principal factors of breakage in timber are the character of the ground and the size of the timber, that breakage increases with the roughness of the ground and size of the timber. This general opinion is borne out by data in Boyce's report "Decay and Other Losses in Douglas Fir in Western Oregon and Washington".

The timber on the sample area just studied was felled on relatively good ground with slopes ranging from 10 to 50 per cent, averaging about 20 per cent. The principal contributing factor in breakage, however, was the character of the bed on which the tree fell; the number and position of stumps, down timber, windfalls and the like. Moreover, the character of the ground with respect to the stumps, down logs, etc. was continually changing as the trees were being felled and as a result relatively good ground before the timber was cut often became very rough for the trees cut last on the area. The problem of breakage, therefore, involved the mechanics of felling a group of trees as well as the mechanics of felling individual trees.

Survey of Sawmill Waste in the Douglas Fir Region

Hodgson continued with the computations of data secured in the intensive study of sawmill waste in hemlock sawmills. The individual or preliminary reports of four of the shifts studied have now been completed and some very interesting information regarding the production and present utilization of sawmill waste is being revealed.

Commercial log scaling in the Douglas fir region is based on a log 40 feet in length but heretofore it has been the practice on Forest Service timber sales to base the log scale on a 32-foot log. In recent months the Forest Service has decided to change its scaling practice to conform with that of the industry and some interest as to the amount of over-run which may be expected under the new scaling practice has been aroused. During the intensive study of sawmill waste in western hemlock mills an accurate scale of logs and lumber tally was taken and so that a comparison could be made the log scale was taken on a basis of both a 32-foot log and a 40-foot log. While only about half of the study shifts have been worked up in final form the comparison as to over-run resulting from the two methods of scaling logs indicates what may be expected. This comparison is presented in the following table:

Mill	A	A	A	B
Study shift	1	2	3	1
Species	Western hemlock grown near coast on low land	Western hemlock grown near coast on low land	Western hemlock grown inland on high land	Western hem- lock grown inland on high land
No. of logs sawed	168	166	138	235
Size of av. log	35.5'x15.4"x19.6"	34.6'x15.0"x19.6"	35.2'x18.0"x23.0"	36.5'x18.7" x24.0"
Scale - Based on 32' log	56,830 ft.b.m.	53,410 ft. b.m.	66,530 ft.b.m.	139,560 ft. b.m.
Scale - Based on 40' log	51,990 ft.b.m.	49,350 ft. b.m.	62,560 ft.b.m.	129,690 ft. b.m.
Lumber produced	59,390 ft.b.m.	58,103 ft. b.m.	73,039 ft.b.m.	150,875 ft. b.m.
Over-run - based on 32' log	4.3 per cent	8.1 per cent	8.9 per cent	8.7 per cent
Over-run - based on 40' log	12.5 per cent	15.1 per cent	14.4 per cent	16.3 per cent

Note - Both mills (A & B) are selling waste wood to a pulp mill and are slabbing heavily. Neither mill has a slab resaw. Both mills are using band headsaws.

1929 Census of Lumber, Lath, Shingles, Logs Cooperage and Veneer

Gibbons devoted the bulk of his time to this project, Johnson well toward two weeks. The survey is gradually drawing to a close. The work this year seemingly has gone slower than any previous year; in the case of a number of companies it has been very difficult to get replies, and the number of unsatisfactory reports has been exceptionally large.

A total of 854 reports have been transmitted to Washington to date, with several hundred completed reports ready to be sent. Approximately 100 companies remain from whom no reply of any kind has been received, this after five or six requests.

Publications

The Agricultural Year Book for 1930 published an article by Hodgson entitled "Timber Waste Large in the Northwestern Douglas Fir Forests". This short article summarized the results of the Survey of Logging Waste in the Douglas Fir Region.

The July issue of Popular Mechanics published a five-page article entitled "Wanted - An Inventor" under the pen name K. J. Watson. This article, headlined on the front cover of the magazine, was written by Mr. John Anderson of the Portland Telegram's editorial staff and was based on Hodgson's report "Logging Waste in the Douglas Fir Region" and interviews with Guthrie of Public Relations and Hodgson. The article itself, as well as the photographs, are presented in very popular style and there are a few statements made which may be somewhat misleading, but it illustrates one way by which the general public may be reached in the dissemination of data prepared for technical reports.

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FOREST TAXATION INQUIRY

North Carolina

The field work in Chatham County was completed in the early part of the month, and a good start made in Macon County. The bulk of the clerical work in Macon County has been completed. The assessment data for Beaufort County have been punched on the Hollerith cards, and similar work for Chatham County has been started. The files of the Forest Supervisor at Franklin, North Carolina, are being used by Thomson in getting information as to the location and character of tracts which have been examined for purchase by the government.

Public Finance Studies

Allin completed an office report on this project, gathering together information dealing with receipts and expenditures of forest and agricultural communities in both eastern and western states. This report, which contains 102 tables and a number of charts, is probably of too great bulk and too little general usefulness to permit of publication in progress report form. It is, however, a valuable addition to the Inquiry files for use in connection with the preparation of the comprehensive report on forest taxation.

Cooperative Activities

The State of Florida through its Forestry Department is undertaking a study of forest taxation in that State. Mr. J. J. Goulden, who is to have direct charge of this study, spent three days at the New Haven office during the latter part of the month studying the plans used by the Inquiry and discussing various points with members of the staff. He expects to take advantage of the Inquiry's experience in technique and use such methods as may be applied to the purposes of the Florida study to best advantage. It is expected that this work in Florida will give the Inquiry additional important data.

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RANGE RESEARCH

WASHINGTON

Intermountain Forest and Range Experiment Station Established

The Secretary has approved the establishment of the Intermountain Forest and Range Experiment Station with headquarters at Ogden, Utah. This headquarters decision followed a careful consideration of other places in the Intermountain Region. It was deemed inadvisable to disrupt the very cordial relations existing between the Great Basin Experiment Station and the administrative organization of the Intermountain Region.

C. L. Forsling, Principal Silviculturist, becomes Director of the new and enlarged station. The Great Basin Experiment Station, of which Forsling has been Director since 1922, becomes a branch of the new station. The work under way also includes studies of desert and spring-fall range both in Idaho and Utah, the problem of vegetation in relation to erosion control on the Boise National Forest, and a study of methods of cutting of western yellow pine in Idaho.

Campbell Concludes his Washington Detail

R. S. Campbell, recently promoted to the position of Associate Forest Ecologist in charge of the Jornada Range Reserve, completed the compilation and preliminary analysis of the grazing capacity project on the Jornada and left Washington early in June. Campbell not only accomplished a great deal in connection with this important Jornada project, but he was of considerable help to the range research organization in Washington.

Manuscripts

Chapline and Campbell spent a week at McKeesport, Pennsylvania, with J. D. Schoeller, formerly Director of the Jornada, in connection with the revision of the manuscript "Grazing Capacity and Permanent Range Cattle Production in Southern New Mexico."

Dayton's "Important Western Browse Plants" and "Glossary of Common Botanical Terms" were submitted to the Department during the month and it is hoped that they will be forwarded to the Government Printing Office shortly for publication.

A day's stop in Washington by R. H. Canfield of the Jornada, returning from Yale, made possible a brief consideration of his project "The Effects of Intensity and Frequency of Clipping Black Grama and Tobacco

Grass on Yield." This report brings out quite clearly the inadvisability of repeated close clipping of the black grama in southern New Mexico. On the other hand it indicates that repeated close clipping of tobosa grass, which reproduces extensively by root stocks, was not detrimental but was, in part, beneficial. The management on the reserve is arranged to secure as heavy use of tobosa grass during the summer as possible and reserve black grama range for fall and winter use.

Public Lands Commission Holds Hearings

The President's Public Lands Commission met early in July with all members in attendance, except Col. Greeley and Mr. Moynihan. Chapline accompanied the Forester and Rachford during the hearings of Forest Service matters. Most of the consideration covered questions regarding administration of the public domain. Major Stuart, however, presented certain information regarding studies of watershed protection made by the Forest Service as related to the public domain problem. Chapline made a brief statement on "Experiments Showing Possibilities of Rehabilitating the Public Domain."

Prof. Herbert C. Hanson Emphasizes the Need for Range Research

The importance of grazing land in the eleven western states is usually not fully realized. Other crops, such as wheat, cotton, apples, oranges, sugar beets, etc., have received much more attention than the wild forage crop on range lands. It appears that just because this forage is native, because it does not have to be seeded, cultivated, irrigated, mowed or harvested with machinery that it needs no particular attention or study. The idea has often prevailed and appears to prevail today in many places that all that is necessary to utilize the native forage is to turn the livestock on it.

This policy has resulted in widespread severe damage to western ranges. Some areas are so badly depleted that recovery, if at all possible, will require many years. Such misuse is inexcusable. The stockman, however, who desires to use his range to the best advantage, is greatly handicapped because so little is known about scientific methods of maintaining and utilizing range forage. Data and methods are slowly accumulating, but as yet little is known regarding even the best methods to employ in investigating range forage. Before range management can be placed upon a sound scientific basis the same kind of thorough study will have to be given to range forage crops that is now being given to the production of most other crops. The study is more difficult because so many conditions are not under control.

J. Frank Dolre Refers to Changed Range Conditions

The Southwestern Daily Bulletin quotes the following from "A Vaquero of the Brush Country:"

"There have been three eras in the cattle industry. First there was the era of the open range, where grass was free and nature supplied the only water. Second, came the era of barbed wire, of land control, also of pastures fenced in and stocked before they were even half supplied with wells, windmills and dirt tanks. Add to these facts, the fact that as the range settled up it became cut and flowing creeks and springs were choked with washed soil, so that they no longer flowed. The western half of Texas does not, today, possess one-third of the living water that it possessed fifty years ago."

RANGE FORAGE INVESTIGATIONS

Among the interesting plants reported out this month were the following:

The collection of the mountain-ash, Sorbus dumosa, Washington office no. 61917, on the Coronado National Forest in Arizona by Assistant Supervisor W. J. Anderson, marks a southeastern extension of range for this species.

Dr. Charlton R. Ball states that Ranger C. H. McDonald's no. 858, Washington office no. 60660, Salix orestera, collected on the Teton National Forest in Wyoming is a rare species of willow.

The late Mr. Ingram's nos. 3106 and 3111, Washington office nos. 61873 and 61874, are two specimens of Pentstemon watsoni, the collection of which on the Deschutes National Forest in Oregon marks a westward extension of range for the species.

Director Campbell's submission of a specimen of Allenrolfea occidentalis, Washington office no. 61916, from near the Jornada Range Reserve, adds a new genus to Forest Service records.

Sixteen species new to Forest Service records were added to the herbarium.

Eight collections, representing 116 plants were reported out to the field, and 348 photostatic prints of economic notes cards were sent. Three collections were submitted to the Bureau of Plant Industry for formal determination.

In Mr. Dayton's absence considerable time was spent on routing correspondence, and also in checking up the illustrations for his glossary before it went to the Department for publication.

One hundred fifty-eight plants were mounted, and about five hundred specimens were filed in the herbarium.

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SANTA RITA RANGE RESERVE

Range Conditions

Very unusual range conditions have existed on the reserve, as elsewhere in southern Arizona, during the month of June. As a result of good rains throughout, the spring perennial grasses have made a great deal more than normal growth and remained green up to the middle of June, at which time several good rains (totalling 3.22 inches at Florida Station as compared to a 29-year average of .53 inches for the month of June) fell and started growth again. On the average June is noted for being the driest and hottest month of the year with nothing in the way of green growth at all. Certainly, since 1921 there has never been anything that even approached the perennial grass growth that has occurred this spring and particularly during June. The result upon density and summer forage production will be interesting to watch. Other parts of southern Arizona have experienced similar conditions though, as always, there have been places that have had no more than normal spring conditions. Cattle on the reserve are in very good condition and appear 15 to 20 per cent above the condition of outside cattle in the region.

Miscellaneous

From June 16 to 21, we were favored with a visit from Bill Dayton of the Washington Office, (incidentally his first visit to the reserve and this part of Arizona). After showing him around Tucson we spent a day and a half going over the Santa Rita and attempting to give him a bird's eye view of our field projects. The latter part of his visit consisted of a 3-day "show me" trip through the southeastern part of the State in company with Fred Winn and Matt Culley. On the trip the following places were visited: Florence, Boyce Thompson Arboretum, Miami, Globe, Coolidge Dam, Safford, Willcox, Faraway Ranch, Rodeo, Douglas, Bisbee, Tombstone, Patagonia and Nogales. Several hundred other stops were made to enable Bill to collect some few of the many hundreds of plant species that grow in the region. Much of the region traversed showed unmistakable signs of

past and present (despite the exceptionally favorable spring) severe overgrazing and conditions generally showed the size of the task that is ahead of range research. We were glad to have Dayton with us and only hope he can pay us another visit during the summer months when we get out real growth of vegetation.

On May 31 the station staff moved out to Florida Station for the summer field season and a very welcome change it was, too, since Tucson weather has been decidedly hot in comparison with that of the station. Early and unexpected rains in June have made it necessary to start some of our project work 3 to 4 weeks ahead of the usual time.

Considerable time has been devoted to checking up recent range improvements and maintenance projects and all in all the present season promises to be a busy one.

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JORNADA RANGE RESERVE

Southern New Mexico Still Dry

Scattering rains fell over the reserve during June, but the month was true to form in that it was dry. Cattle were in fair condition and no supplemental feeding was necessary, although many adjoining ranches fed heavily to bring their cows through the period.

Status of Manuscripts

The Jornada grazing capacity manuscript, to be completed under the joint authorship of Chapline, Schoeller, and Campbell, is under revision to include the 1929 data, which will give a full 14-year period of the project.

Campbell's paper dealing with plant succession on clay soils of the Jornada was considered by the Board of Review and the editor and has come back to the author for revision.

Canfield's report of the Jornada clipping studies, which he used as his Master's thesis at Yale Forest School, was considered briefly by Chapline and the editor and will be submitted for publication as a Journal of Agricultural Research article in the near future.

Personnel on the Move

Campbell returned to the station from Washington on June 22, after spending a week with Chapline and Schoeller at McKeesport, Pa., in consideration of the grazing capacity manuscript.

Campbell Attends the Southwestern Soil and Water Conservation Conference

Campbell attended the Southwestern Soil and Water Conservation Conference held at Stillwater, Oklahoma, on June 19 and 20. The officials of the conference had evidently put in a great deal of time and effort in arranging the program and for convenience of the visitors. There were many fine papers on the program. Campbell made a few remarks concerning erosion and its relation to the range and water use in the Southwest, but did not present a regular paper.

As the representative of the Dallas News brought out, the conference was entirely too much restricted to the topic of farm terracing to be a true southwestern soil and water conservation meeting. Perhaps it was more the fault of agencies which should have participated rather than of the program committee, but it is felt that next year, an effort should be made at the meeting in Missouri to put the conference on a much more nation wide, or at least region wide basis, rather than to confine it so closely to farm terracing. As desirable as that feature is, it would seem highly desirable to have a much better presentation of erosion as viewed from the standpoint of range watershed protection in the West, and timber production in other parts of the region.

Canfield returned to Las Cruces on June 25 from Yale Forest School, where he received his M. F. and reported to the station on June 28.

Oran B. Stanley, a senior at Butler University, Indianapolis, reported for temporary summer work on June 14.

Gordon D. Merrick, who was in charge of the station during Campbell's Washington detail, left on June 26 for the White River National Forest, Region 2, where he joined a grazing survey party.

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